Airport Technology R&D Team - Wildlife Mitigation R&D

Testimony for NTSB Public Hearing on US Airways Flight 1549 Accident of January 15, 2009

Subject: Avian Radar Systems

Presented to: NTSB Public Hearing, Washington DC

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Date: June 9 & 10, 2009

Federal Aviation Administration

Agenda

- **Brief History of FAA Bird Radar Studies**
- **Review Current Activities**
- **Examples of Bird Radar Characteristics**
- **Results and Findings to Date**
- **Conclusion**

Avian Radar History

Background of FAA involvement

Past 15 years (1994-present) have seen private companies build progressively improved avian detection radar systems to meet the requests of early users (primarily military) and anticipated needs

- **1999-2001** - MIT Lincoln Laboratories assess feasibility of using Airport Surveillance Radar (ASR) and NEXRAD to detect biological targets.
- **2001-2002** - FAA/University of Illinois (CEAT) and USAF/Air Force Research Lab (AFRL) Initiate R&D under USAF Dual Use Science and Technology (DUST) Program to develop a dedicated airport bird radar (Waveband Corp. “Birdar”)
- **2002-2004** - R&D and Testing of 94 GHz “Birdar” at DFW, JFK, and Fermi Lab in Batavia IL
- **2005:** FAA leverages DOD progress as avian radar systems become commercially available
- **2006** - FAA announced intention to assess commercially available avian radars
- **2007** – FAA/CEAT/UIUC deploys first bird radar system to SEA-TAC as part of its study
- **2008** – Performance assessment continues at SEA while deployments of additional project radars are coordinated for JFK and ORD
- **2009** – Additional project radar units are deployed to JFK and ORD for performance assessment activities

FAA Bird Detection Technology

Current - Performance Assessment (2007 – Present)

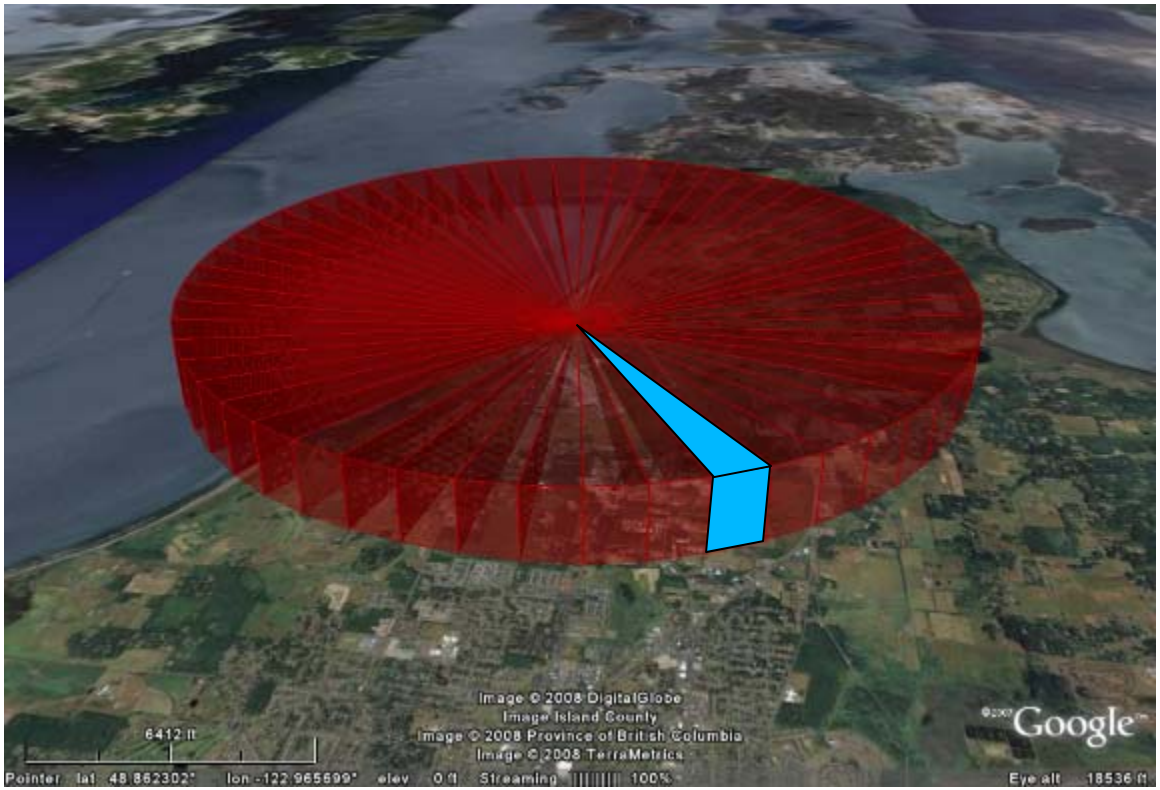
- **Purpose:** Use science-based assessment methods to assure the FAA and the public that use of commercial avian radars at airports is justified based on proven performance, does not compromise safety, and is compatible with all aspects of airport operations.
- **Approach:** Deploy and test avian radars in civil airport operating environment so that FAA can appropriately:
    - Establish expected radar system performance
    - Validate target data characteristics including quality of information
    - Understand the impact of the local environment on system performance
    - Assess electromagnetic compatibility with other airport systems
    - Assess data management, integration and interoperability with existing systems and practices
    - Work with airport personnel including wildlife control personnel to develop beneficial use cases
    - Establish minimum radar system functional and performance requirements
    - Determine updates to regulations
    - Develop guidance on how to acquire, deploy, integrate, acceptance test, operate and maintain including approval for AIP funding
- **Outcome**
    - Federal Guidance on deployment and use of radars at civil airports (e.g. Advisory Circular, Engineering Briefs, Cert Alerts etc.)

Project Deployments of Avian Radars

Avian Radar

Examples of Commercial Systems

Array Antenna Coverage



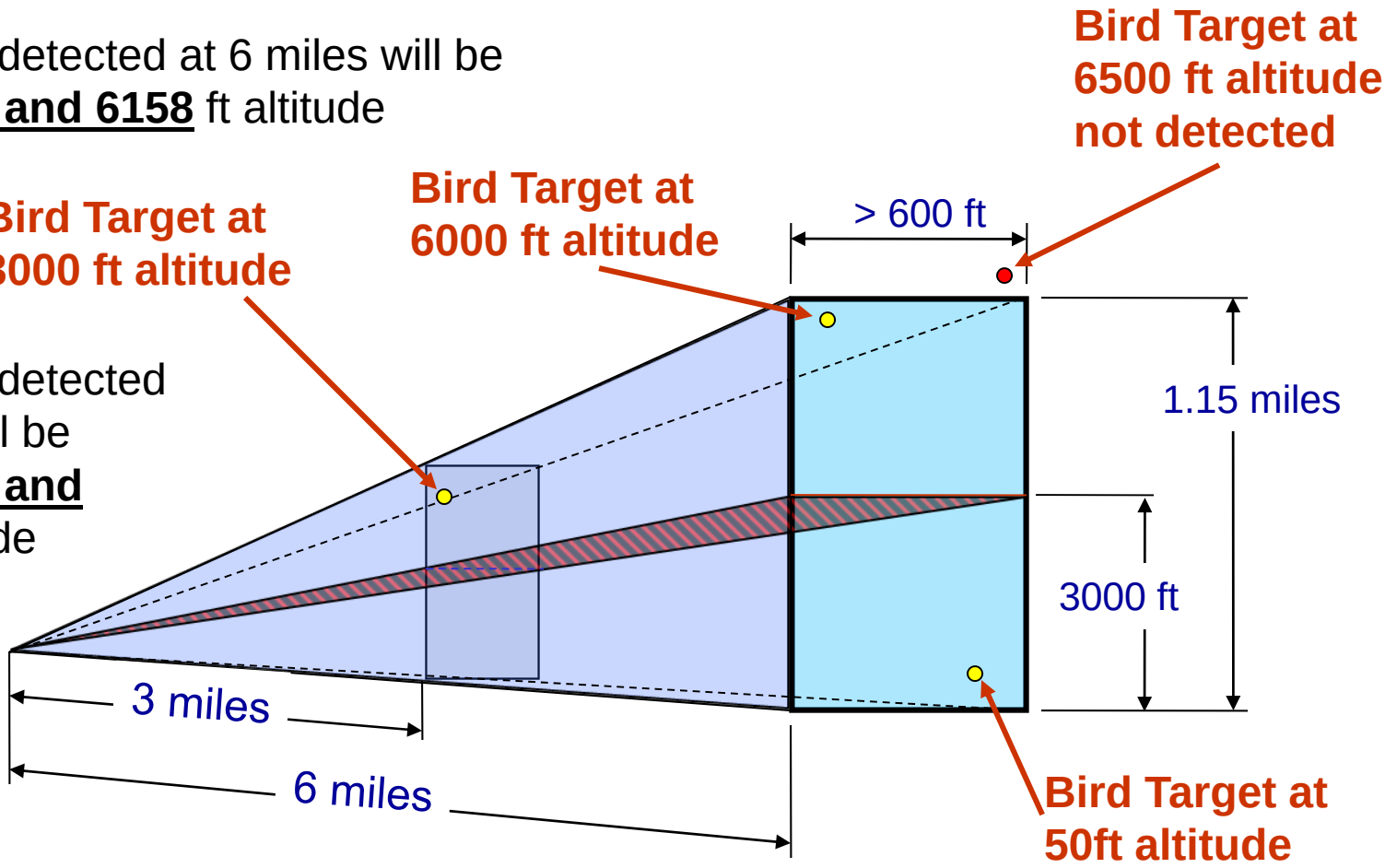
Provides ground-up coverage but no altitudinal discrimination of targets

Array Antenna Coverage Detail

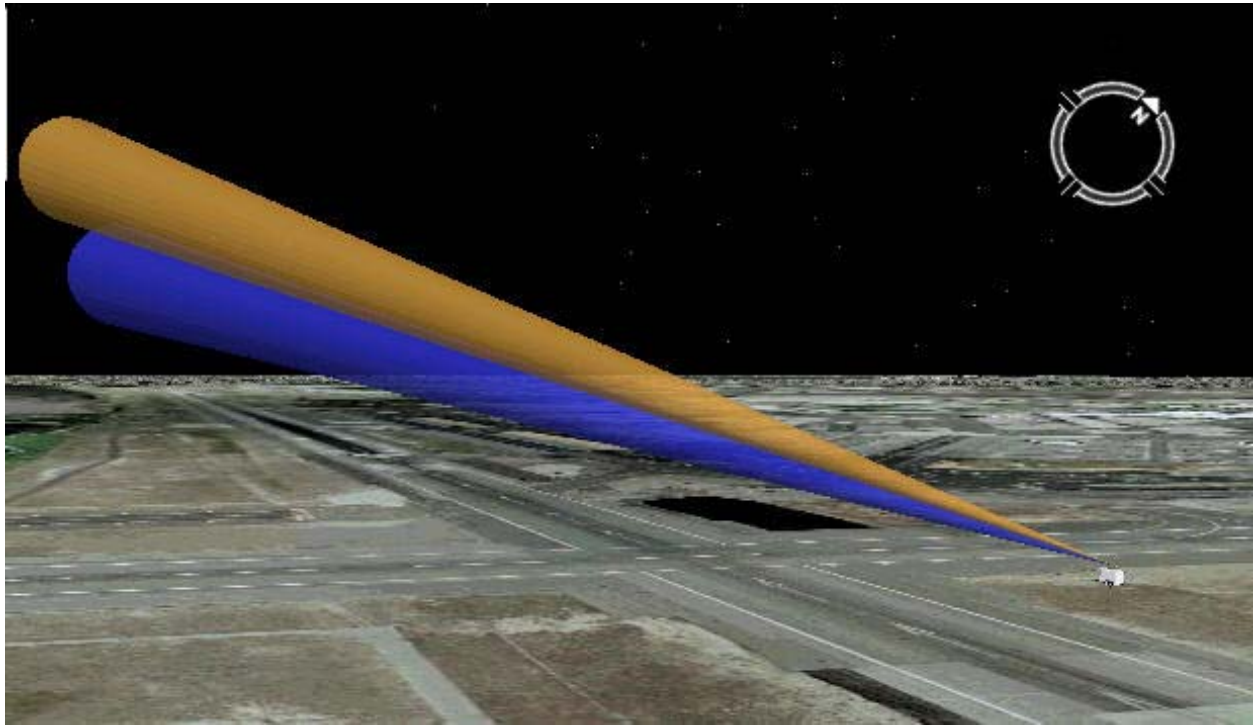
Altitude Discrimination - Example

A bird target detected at 6 miles will be between **0 ft and 6158** ft altitude

A bird target detected at 3 miles will be between **0 ft and 3079** ft altitude



Parabolic Dish Antenna Coverage



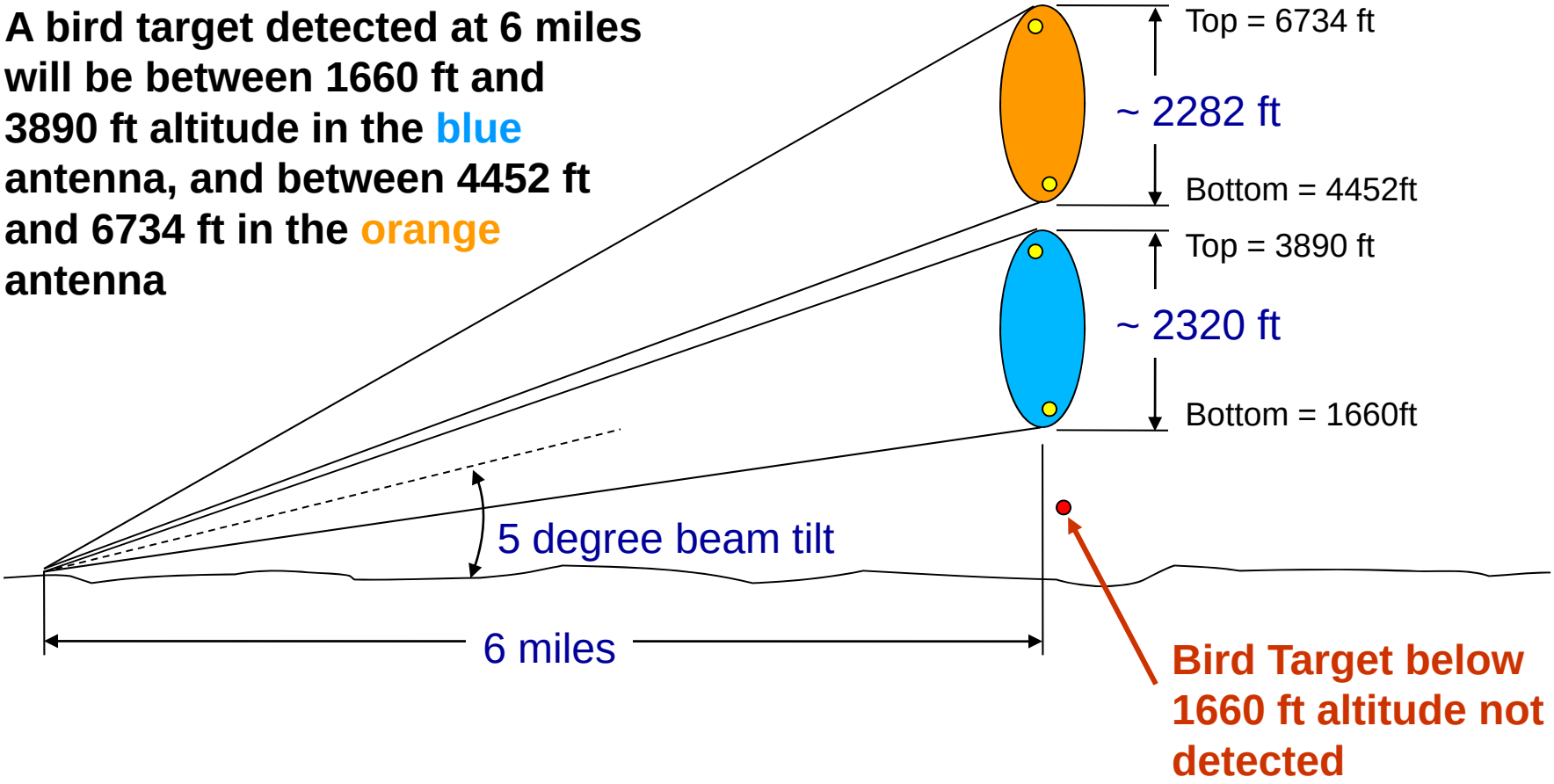
Computer representation of (AR-2) beams at SEA

Bird Radar (AR-2) at SEA

Dish Antenna Coverage Detail

Altitude Discrimination - Example

A bird target detected at 6 miles will be between 1660 ft and 3890 ft altitude in the blue antenna, and between 4452 ft and 6734 ft in the orange antenna



Results and findings to date

ASR-9 and TDWR (NEXRAD)

- **ASR-9 was not designed to detect biological targets.**
- **Advanced processing algorithms can make ASR-9 capable of detecting biological targets**
- **Altitude precision is still an issue**
- **ASR-9 are relatively expensive**
- **ASR-9 does not provide good local coverage of the airspace directly over the airport property.**

Results and findings to date

Performance Assessment of Avian Radar Systems

- **Deployed avian radars at three major US airports (SEA, ORD, JFK)**
- **Two years of data collection completed at SEA demonstrate the utility of avian detection radar systems for enhancing wildlife management practices on airports**
- **Deployment activities have exposed several key considerations that must be accounted for when deploying into a civil airport environment**
- **Draft Final Report "Deployment of Avian Radars at Civil Airports" completed**

Conclusion

- **FAA will continue assessment of avian radar systems for use at airports to enhance wildlife management practices and improve airport safety**
- **FAA endeavors to produce guidance documentation for airport stakeholder use regarding avian radar detection technologies**
- **FAA will consider evaluation of both airport-based and aircraft-based emerging and adapted technologies to detect, track and deter birds**